Kregg E. Arms

Curriculum Vitae - June 13, 2008

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Education

Ph.D. Physics	The Ohio State University	June 2005
M.S. Physics	The Ohio State University	March 2002
B.S. Physics	University of Cincinnati (Magna Cum Laude)	June 1999
Minor Mathematics	*University of Cincinnati*	*June 1999*

Professional Employment

August 2005 - Present	Research Associate (MINOS/NOνA)	University of Minnesota
June 2000 - July 2005	Research Assistant (CLEO/ATLAS)	The Ohio State University
September 1999 - June 2000	Teaching Assistant	The Ohio State University
June 1998 - June 1999	Research Assistant (HERA-B)	University of Cincinnati

Teaching Activities

University of Minnesota	Mechanical Eng. Senior Design Proj. Advisor	January 2008 - May 2008
The Ohio State University	TA Calculus-based General Physics I-III	September 1999 - June 2000

Research Activities

NOνA (September 2005 - present)
The NOνA experiment is designed to search for neutrino flavor oscillations by comparing the different ν_e event rates measured at the Fermilab site (Batavia, IL) with that measured at Ash River, MN, 810 kilometers away from Fermilab. The resulting measurement of the mixing parameter $\sin^2\theta_{13}$ and CP-violating phase δ will be among the highest precision of the next decade. NOνA is also in a unique position to measure the neutrino mass hierarchy, if nature has favored us with large enough mixing parameters. My work has focused on the measurement and quality assurance of the avalanche photodiodes (APDs) used to collect light signals from the scintillator cells of the detector. I have also advised a team of mechanical engineers in their senior capstone project designing & evaluating an optimal cooling system for driving NOνA APDs to a lower noise state at -15^{o}C.

MINOS (August 2005 - present)
MINOS is a precision neutrino flavor oscillation experiment operating at Fermi National Accelerator Laboratory in Batavia, IL. The primarily ν_μ beam spectrum and composition produced at Fermilab's NuMI facility is measured 1km from the source and again 735km away at Soudan, MN. The primary measurement of the project is the disappearane of ν_μ charged-current interactions from expected, yielding precision measurement of the mixing parameters Δm^2_{23} and $\sin^2 2\theta_{23}$. I have participated in the ν_μ disappearance measurement and neutral-current spectrum measurement search for sterile neutrinos. I initiated and continue the ongoing analysis of ν_τ appearance in the MINOS far detector. I currently serve as the Monte Carlo working group coordinator since September 2006.

Sub-millimeter Gravitation (March 2005 - present)
Newtonian gravitation has only been measured precisely down to length scales of hundreds of microns. If extra dimensions exist and the largest of these exists at the order of tens of microns, they may be probed macroscopically by enhancement of the gravitational force on very short length scales. I have been involved in the development of a novel experimental concept capable of measurement of deviations from the Newtonian gravitational force on length scales down to O(10μm) in collaboration with colleagues at OSU and SLAC.

CLEO (November 2001 - September 2005)
CLEO is a general purpose detector at Cornell University's Laboratory of Particle Physics (LEPP) designed for the study of heavy flavor physics, specifically bottom and charm quarks, as well as tau leptons, produced in symmetric electron-positron collisions. My interest in the CLEO experiment was during data-taking at the $\Upsilon(4S)$ resonance, where tau-pairs are produced with a significant boost in the laboratory frame. I engaged in searches for new physics in neutrinoless tau lepton decays, as well as precision measurement and discovery of rare tau branching modes. My doctoral dissertation using CLEO III data was entitled "Study of tau Lepton Decays to Three Charged Hadrons and One Neutral Pion," was advised by Professor K.K. Gan and resulted in a *Physical Review Letters* publication.

ATLAS (June 2000 - March 2005)
ATLAS is a particle physics experiment operating at CERN's Large Hadron Collider (LHC) facility that will explore the fundamental nature of matter and the basic forces that shape our universe. The ATLAS detector will search for new discoveries in the head-on collisions of protons at a maximum center-of-mass energy of 14 TeV. The experiment is designed primarily to search for the Higgs boson, but also the signatures of new physics such as supersymmetry and extra-dimensions. My work in the ATLAS collaboration involved aiding in the design, testing, and simulation of ASICs and optical electronics used in data transfer within the pixel detector.

HERA-B (June 1998 - June 1999)
HERA-B was a large-aperture high-rate spectrometer built for studies of collisions of 920 GeV protons with the nuclei of target wires positioned in the halo of the HERA proton beam located at the proton-electron accelerator HERA at DESY in Hamburg, Germany. HERA-B was optimized to measure CP-violation in decays of B mesons into the so-called "golden decay mode": $B \rightarrow J/\psi K^0$. During my brief time in association with the HERA-B project, I worked on the construction and testing of straw-tube chambers and readout electronics for the outer high-p_T tracking system.

Grants & Awards

TeraGRID (NSF) TG-PHY080024N Development Allocation (30,000 SU (*CPU-hrs*)) February 2008

Services

MINOS	Monte Carlo software/production coordinator	September 2006 - Present
MINOS	UMN Monte Carlo farm production manager	January 2007 - Present
NOνA	Electronics working group support	June 2006 - Present
MINOS	Core software/Monte Carlo/Batch production working group support	September 2005 - Present
TMVA	Software developer	October 2006 - Present
ATLAS	Pixel detector data transmission working group	June 2000 - March 2005
ATLAS	Pixel detector optical-electronics irradiation studies CERN on-site support	April 2001 - August 2002
CLEO	Tau-pair Monte Carlo production support	September 2003 - July 2005
HERA-B	Outer high P_T system construction	June 1998 - June 1999

Principle Publications

K.E. Arms and S. Arms, "Derivation of the Subinterval PDF", *To be submitted to Ann. Stat.*.

K.E. Arms, "A New Measure of Goodness-of-Fit", *To be submitted to Nucl. Inst. Meth. Phys. Res., Sec. A*.

P. Adamson *et. al.*, "A Study of Muon Neutrino Disappearance Using the Fermilab Main Injector Neutrino beam", *Phys. Rev. D* **77**, 072022 (2008).

D.G. Michael *et. al.*, "Observation of muon neutrino disappearance with the MINOS detectors and the NuMI neutrino beam", *Phys.Rev.Lett.* **97**, 191801 (2006).

CLEO Collaboration, "Study of τ Decays to Four-Hadron Final States with Kaons", *Phys. Rev. Lett.* **94**, 241802 (2005).

K.E. Arms *et. al.*, "ATLAS Pixel Opto-Electronics", *Nucl. Inst. Meth. Phys. Res., Sect. A* **554**,

458 (2005).

CLEO Collaboration, "Search for neutrinoless τ decays involving the K^0_S meson", *Phys. Rev. D* (*Rapid Comm.*) **66**, 071101 (2002).

K.E. Arms *et. al.*,"Radiation-Hard ASICs for Optical Data Transmission in the ATLAS Pixel Detector", Proceedings of The Meeting of the Division of Particles and Fields of the American Physical Society, Riverside, CA, 2004. *Int. J. Mod. Phys. A* **20**, 3802 (2005).

Invited Talks

"Always Beyond the Standard Model: Measuring Neutrino Flavor Oscillations in Minnesota", Physics Department Colloquium, Minnesota State University Mankato, January 31, 2008.

"New Results from the MINOS Experiment", High Energy Physics Seminar, University of Minnesota, September 18, 2007.

"Neutrino Oscillation Results from MINOS", Implications of Neutrino Flavor Oscillations (INFO 07), Santa Fe, NM, July 2, 2007.

"Research Interests in the ATLAS and CLEO Particle Physics Experiments", High Energy Physics Seminar, University of Minnesota, May 20, 2005.

"Radiation-Hard ASICs for Optical Data Transmission in the ATLAS Pixel Detector", Meeting of the Division of Particles and Fields of the American Physical Society, Riverside, CA, 2004.

"Observation of Rare τ Lepton Decays to Strange Mesons", Physics Department Seminar, The Ohio State University, July 19, 2004.

"Radiation-Hard ASICs for Optical Data Transmission in the ATLAS Pixel Detector", Meeting of the Division of Particles and Fields of the American Physical Society, Williamsburg, VA, 2002.

Professional Honors, Societies, & Certifications

American Physical Society - Division of Particles and Fields
CERN Users Group
Fermi National Laboratory Users Group
Phi Beta Kappa
Radiation safety certification: OSU (2000-2005), CERN (2002), U. Minnesota (2007)
Sigma Pi Sigma
University of Cincinnati University Honors Scholar
University of Cincinnati Voorheis Scholarship

References

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Publications

[1] P. Adamson *et al.* [MINOS Collaboration], Phys. Rev. D **77**, 072002 (2008) arXiv:0711.0769 [hep-ex].

[2] P. Adamson *et al.* [MINOS Collaboration], Phys. Rev. D **76**, 072005 (2007) [arXiv:0706.0437 [hep-ex]].

[3] P. Adamson *et al.* [MINOS Collaboration], Phys. Rev. D **76**, 052003 (2007) [arXiv:0705.3815 [hep-ex]].

[4] P. Adamson *et al.* [MINOS Collaboration], Phys. Rev. D **75**, 092003 (2007) [arXiv:hep-ex/0701045].

[5] D. G. Michael *et al.* [MINOS Collaboration], Phys. Rev. Lett. **97**, 191801 (2006) [arXiv:hep-ex/0607088].

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[16] G. Bonvicini *et al.* [CLEO Collaboration], Phys. Rev. Lett. **96**, 022002 (2006) [arXiv:hep-ex/0510034].

[17] P. D. Jackson *et al.*, *Prepared for 11th Workshop on Electronics for LHC and Future Experiments (LECC 2005), Heidelberg, Germany, 12-16 September 2005*

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[21] D. Cronin-Hennessy *et al.* [CLEO Collaboration], Phys. Rev. D **72**, 031102 (2005) [Erratum-ibid. D **75**, 119904 (2007)] [arXiv:hep-ex/0503052].

[22] C. Cawlfield *et al.* [CLEO Collaboration], Phys. Rev. D **71**, 077101 (2005) [arXiv:hep-ex/0502012].

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